OHIO BRASS MANAGEMENT REPORT

You can smile in the rain as new generator attacks your EHV problem

BY ROGER A. BLACK
PRESIDENT, OHIO BRASS COMPANY

People who enjoy rain are usually incurable romantics, farmers, or roofing salesmen. Make of it what you will but I must admit that I recently stood in the rain and smiled. If you had been there and had an EHV problem, you would have smiled, too. The place was the O-B High Voltage Laboratory. The occasion was the firing of a new four-million-volt, high-energy impulse generator. The rain poured down on the generator. But it could have been standing in the middle of the desert. It fired and continued to fire, demonstrating that O-B could do outdoor testing, rain or no rain.

THE NEW UNIT rises almost 50 feet in a stairstep design that resembles a giant pipe organ. Firing gaps are enclosed in metal housings mounted at each step. The enclosures, plus the special care used in protecting other circuit components, make all-weather testing possible.

I WON'T ARGUE THE MERITS of indoor versus outdoor testing since we have long done both, depending on the most realistic way to attack the problem. More significant to our customers is the increase in our capability to do outdoor testing. Not only can we work in all kinds of weather — just like the full-scale transmission line components under test will be required to do in service — but we also have a research tool especially designed to analyze switching surges on extra-high-voltage systems. And the switching surge has been singled out as the most important factor to consider in insulating a line of 345 kv or higher.

THE NEW GENERATOR has five times the energy output of our three-million-volt generator so it's obvious that the voltage is only one measure of its capability. It has been especially designed to produce switching surge wave shapes. Because of O-B experience with lightning arresters and insulators and because of our laboratory facilities, both new and old, we are especially qualified to help you handle switching surges in the most economical way. The savings can quickly run into the millions. We know this is true because we've already helped do it.

IT'S EASY TO SMILE, even in a hard rain, when you look at a tool that can make possible this kind of savings. And I would hope our customers could smile a little, too.

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OHIO BRASS COMPANY • MANSFIELD, OHIO
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OHIO BRASS

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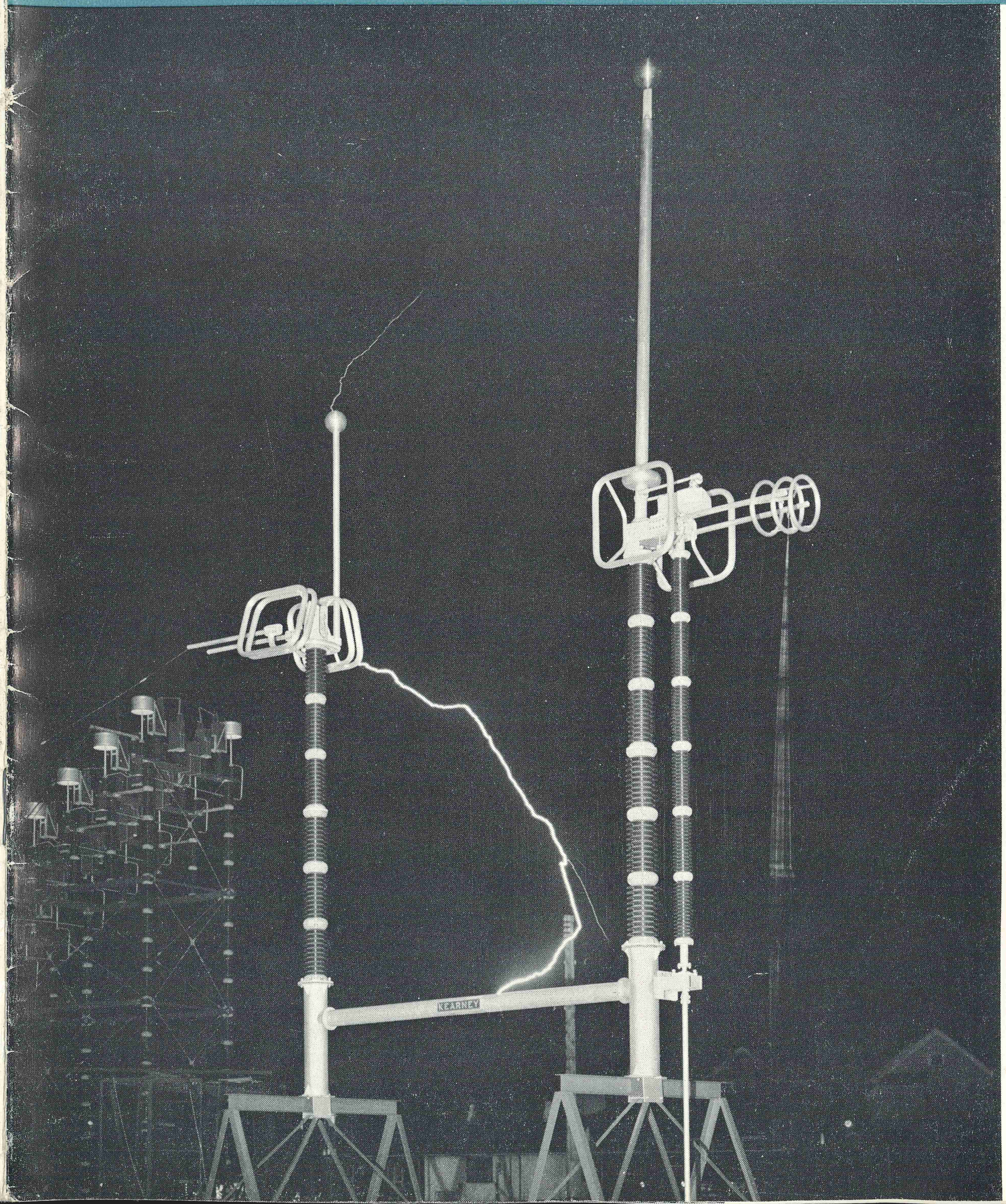


Impulse flashover of the new 735-kv Hydro-Quebec disconnect switch during design tests in O-B's High Voltage Laboratory. See page 7.

O-B Thorex multiresters protect rebuilt transformers

Dayton Power and Light repairs transformers and installs new Ohio Brass distribution lightning arresters for high efficiency and added years of service life

Dayton Power and Light operates a maintenance shop for the rebuilding of its distribution transformers. With this important facility, the company extends the operational life of its distribution transformers and boosts their service efficiency on the pole. Ohio Brass Thorex Multiresters are utilized by DP&L in this transformer rebuilding program.

Why New Arresters

DP&L believes that the installation of new lightning arresters is vital to the rebuilding of distribution transformers. Good arrester protection provides the needed extra measure of service insurance that a rebuilt transformer requires.

O-B Multiresters provide this kind of service protection. The superior capabilities of O-B arresters offer generous protection for new equipment and for equipment that has been in service and may not have its original insulation strength.

Mounting Brackets

In addition to offering good protection for distribution transformers, O-B Thorex arresters have attractive mechanical features beneficial to transformer repair. The line terminal support and base casting contain threaded holes. Mounting the unit on some form of support and attachment of gap electrodes is only a matter of making bolted connections. What could be simpler and easier?

The only accessory required in many cases is a plain L-shaped supporting bracket. It is a volume-produced, low-cost item which provides for side-mounting and vertical adjustment. DP&L uses this method to attach Thorex Multiresters to its distribution transformers. The company also uses a second type - a bushing-cover mounting bracket. It is a fan-shaped plate with two holes for top mounting and a body band to hold the arrester.

The gap electrode provides for vertical bending that allows accurate setting of the gap spacing.

Repair Shop

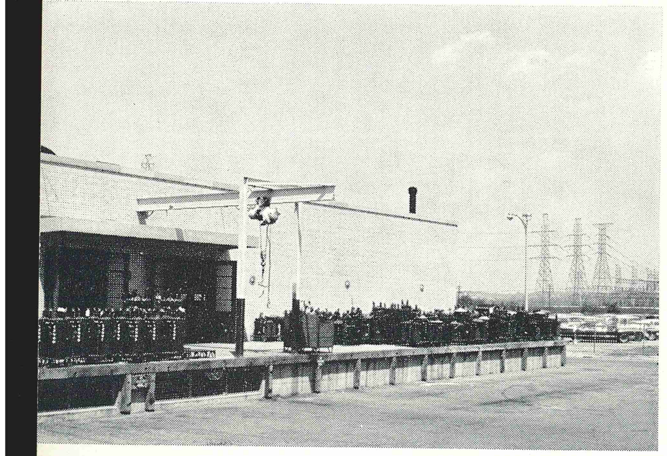
DP&L is equipped to process many units through its transformer shop. The operation is manned by six men and occupies a large portion of a modern shop building with a crane-equipped loading dock. Transformers are stored temporarily in the yard after rebuilding.

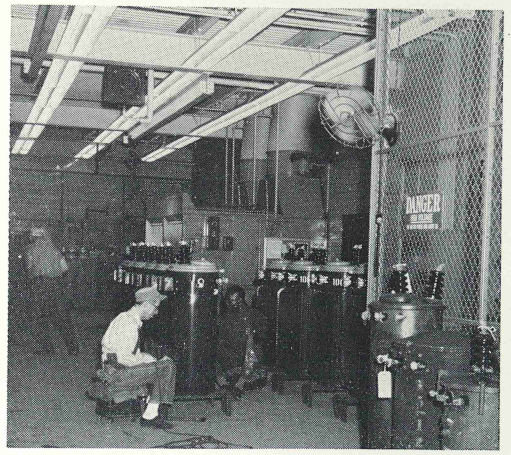
The company has set up its transformer repair shop on a production line basis. To-be-repaired units are stored on pallets on one side of the loading dock. The group contains all sizes, shapes, and makes of transformers with different types of arresters, gap electrodes, and mounting brackets.

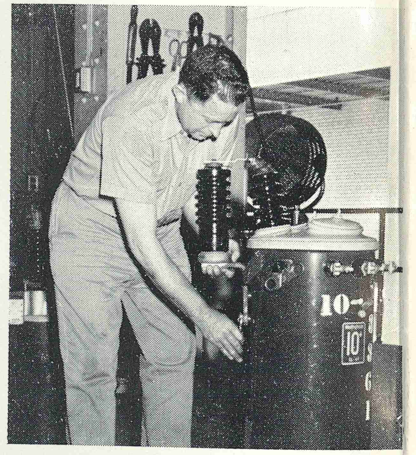
In the shop, each transformer is inspected to see what work it will require in addition to the routine repair. As a matter of course, badly rusted and worn parts are replaced, others are cleaned and painted. Units are refilled with fresh oil. New distribution lightning arresters are mounted on each transformer.

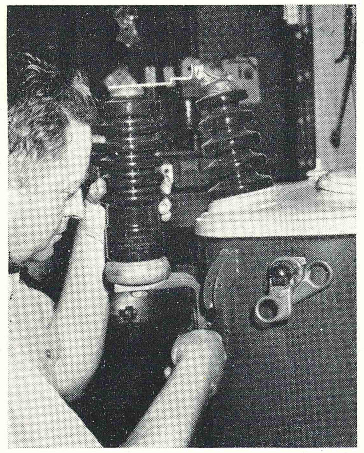
Completed transformers are tested prior to final OK and release for service. They are stored temporarily in the yard in front of the shop and picked up when like-new transformers are needed by the DP&L distribution line maintenance crews.

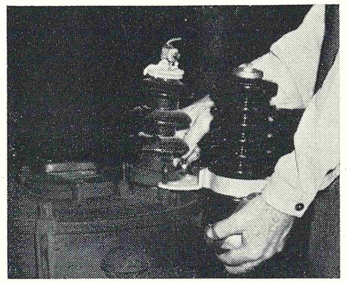
DP&L uses O-B Multiresters in its transformer rebuilding program because O-B's products offer an attractive combination of superior protection and simple, low-cost mounting arrangements. You can provide your transformer repair people with the same product excellence. Order O-B Thorex Distribution-Class Lightning Arresters from your Ohio Brass representative.

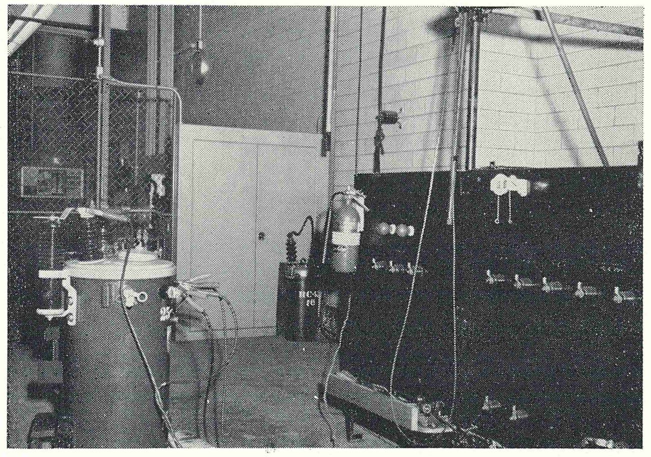

LOADING DOCK for receipt of to-be-repaired distribution transformers, at right, and shipment of rebuilt units, at left. Storage yard is in the foreground.


REPAIR SHOP work on distribution transformers includes cleaning, oil refilling, parts replacement, painting, testing, and general reconditioning.

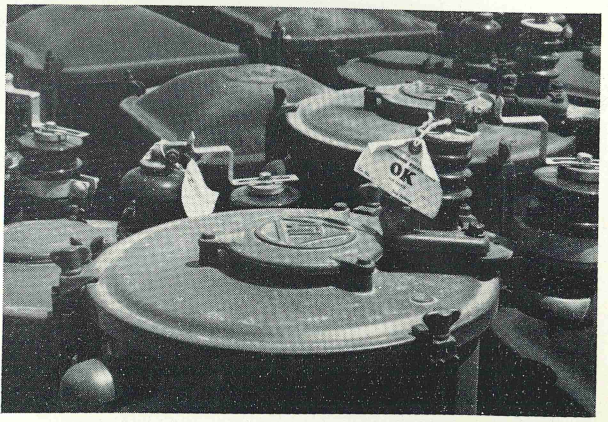

O-B DISTRIBUTION ARRESTER is side mounted on a transformer with an O-B mounting bracket. Electrode is adjusted with precision after arrester is positioned.


VERTICAL ADJUSTMENT of O-B side mount offers vertical movement. Electrode adjusts horizontally, readily bends vertically to provide precise gap spacing.


TOP - MOUNTED DP&L bracket utilizes fan-shaped plate with two screw holes for positioning of arrester. Body band holds arrester, keeps electrode in place.


ELECTRICAL TEST is performed on rebuilt distribution transformer. High test standards helps maintain quality, reduces future repair and maintenance problems.

OK TAG says O-B Multirester is ready to provide high-efficiency protection for its rebuilt transformer at Dayton Power & Light.



BACK TO WORK as lift truck puts unit on delivery truck, workman checks off serial number of transformer as it returns to service on Dayton's distribution system.

Side loading and uplift easily dealt with in V-string construction

Simpler than with single vertical insulator strings

Several engineers investigating the use of V-string insulators in extra-high-voltage line construction have questioned us regarding the problem of unloading one of the strings due to the side force of wind blowout of conductors, or unloading both strings due to uplift.

Any problems of this type that exist with V-strings are in no way new to line design. They may be even less severe than with single vertical insulator strings.

Take the question of wind blowout. With free - swinging single strings this condition had to be computed as accurately as possible, probably with some safety factor, in order to establish minimum electrical clearance between the conductor and the tower. This located the suspension point of insulators on the crossarm and defined the width of the center opening or tower "window." Therefore, a realistic assumption of maximum wind blowout has been a factor in line design from the earliest days of transmission.

While V-strings restrain horizontal movement of the conductor at the tower, and thus materially reduce certain tower dimensions, the conductor at its full blowout angle in mid-span transfers its lateral force, at this angle, to the suspension point. Obviously, if the resultant load angle rises above the angle of the insulators on the windward side of the V-string, the leeward string will become mechanically unloaded. This is not desirable.

Several formulae have been developed to relate angle of the V-string to maximum angle of blowout, but a simple diagrammatic approach is perfectly sound. (See Figure 1) The angle of the "V" measured from vertical should be approximately five degrees greater than the anticipated maximum angle of blowout. This will assure constant loading of both strings.

One of the more customary assumptions for maximum blowout angle is 40 degrees. Especially with heavy conductors used in EHV construction, this is considered safely beyond the limit of ordinary winds. In a case recently observed, with tower spacing of about 1,200 feet and twin 1.65-inch conductors, a 50-mile side wind displaced the conductors an estimated 15 degrees.

Where a 40-degree blowout angle is assumed, the V-strings are built at 45 degrees. This is a conventional type of construction. If, however, hurricane winds must be anticipated, there is no harm in widening the "V" to a greater angle. This may be a considerably more simple measure than dealing with a violent blowout angle on free-swinging strings.

Contour of a line occasionally produces a no load condition on a few insulator strings, or even a rare case of uplift. There may be occasional economic reasons for tolerating such a condition but, generally speaking, it is undesirable and may even cause damage to ball-and-socket type insulators. In case of necessity, however, V-strings can operate with an uplift as much as 12 inches without requiring special treatment. The insulator strings, in this case, will assume a slightly looped condition as opposed to their normal straight "V". (See Figure 2)

Where compensation is made for uplift . . . much to be recommended . . . auxiliary weight must be added, the same as with single insulator strings. Designers are cautioned to apply weight to each clamp in the case of bundle conductors, and not to the yoke support. If applied to the yoke, the uplift will cause clamps to rotate into a distorted position in relation to their support.

Special fittings are available to apply auxiliary weight to clamps. These hold down shackles, listed in the O-B hardware catalog, attach to the clevis pin of the clamp and impose weight directly at this point. The clamp cannot rotate out of normal position because of the stabilizing action of weight suspended from the clevis pin.

If two or more clamps are to be held down by a single weight, a special fitting can be supplied for this purpose. Wherever practical, however, it has been found more simple to apply a separate weight at each clamp. Weights can be furnished with other O-B hardware, but their shipping cost usually makes it more economical to have them cast in a local foundry.

It will be seen that unloading or uplift problems with V-strings are dealt with in a conventional manner. In general the V-string, with its many other virtues, presents no new unloading problems and even relieves a few that previously existed with vertical insulator supports.

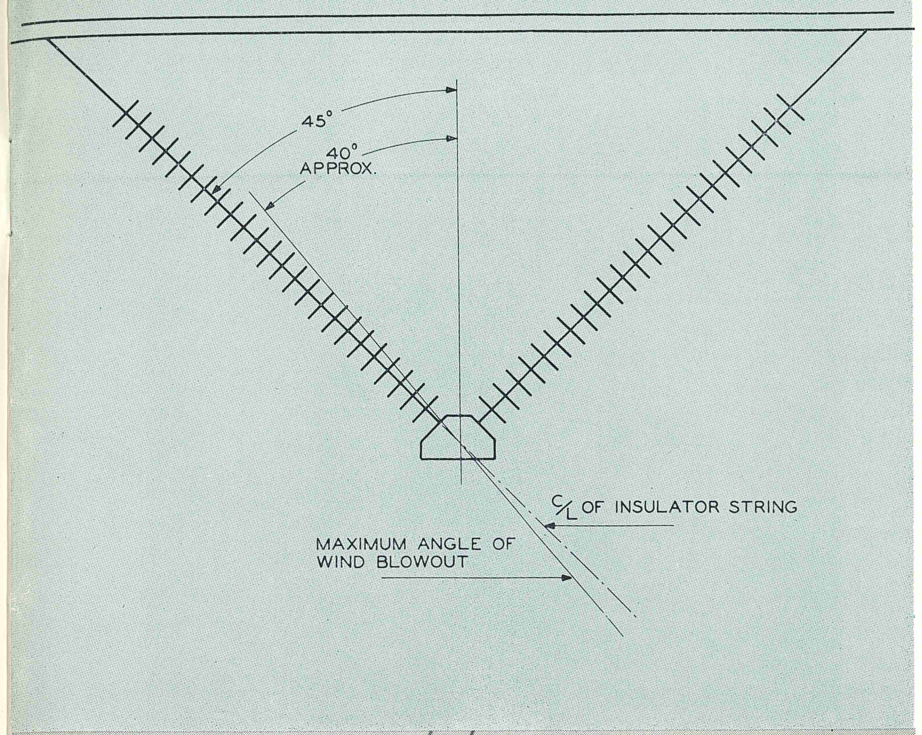


Figure 1—Diagrammatic presentation of relation between wind blowout and V-string angle. In all cases the angle of the V-string from vertical should exceed by about five degrees the maximum angle of the conductor. In the case shown, a computed blowout of 40 degrees calls for a 45-degree V-string support.

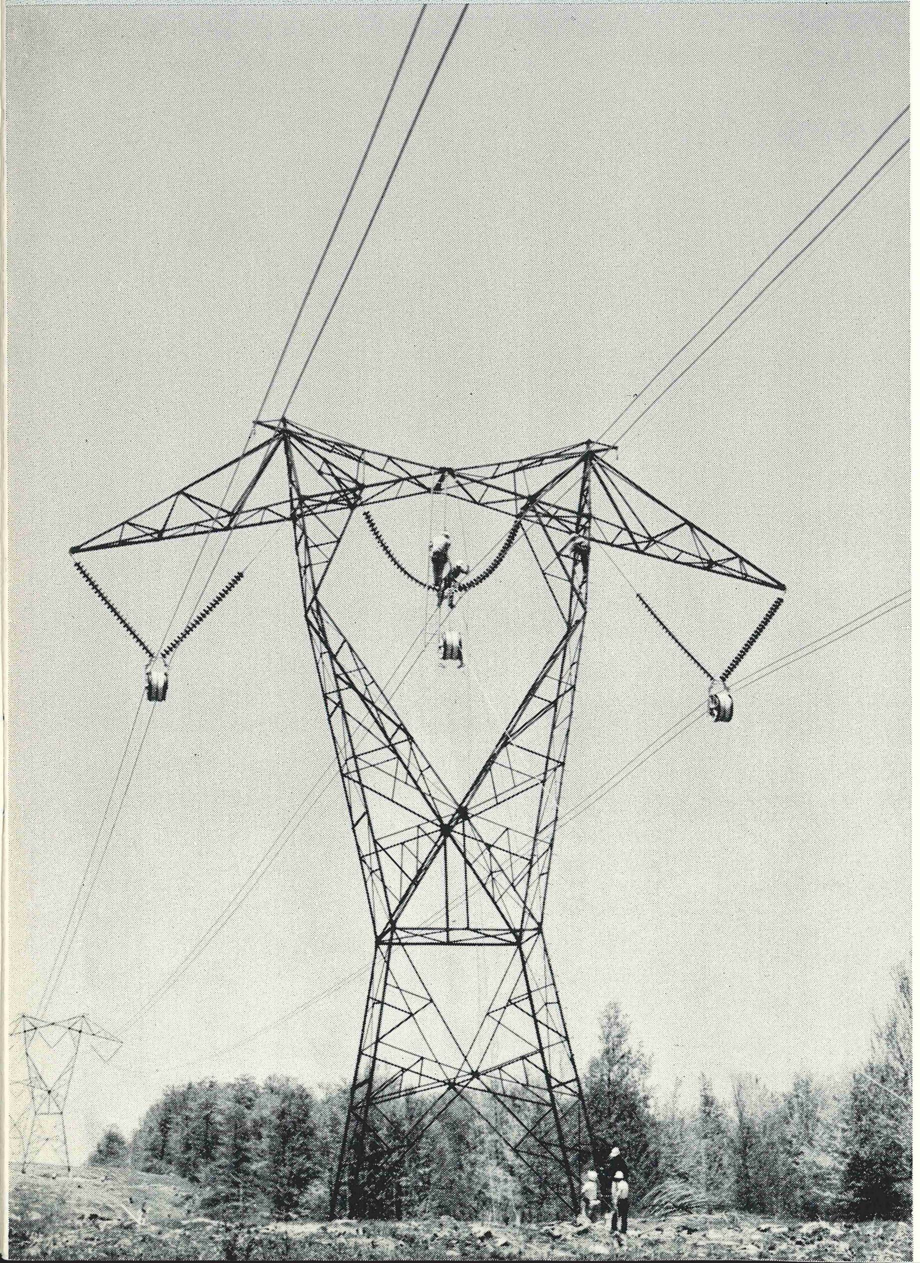
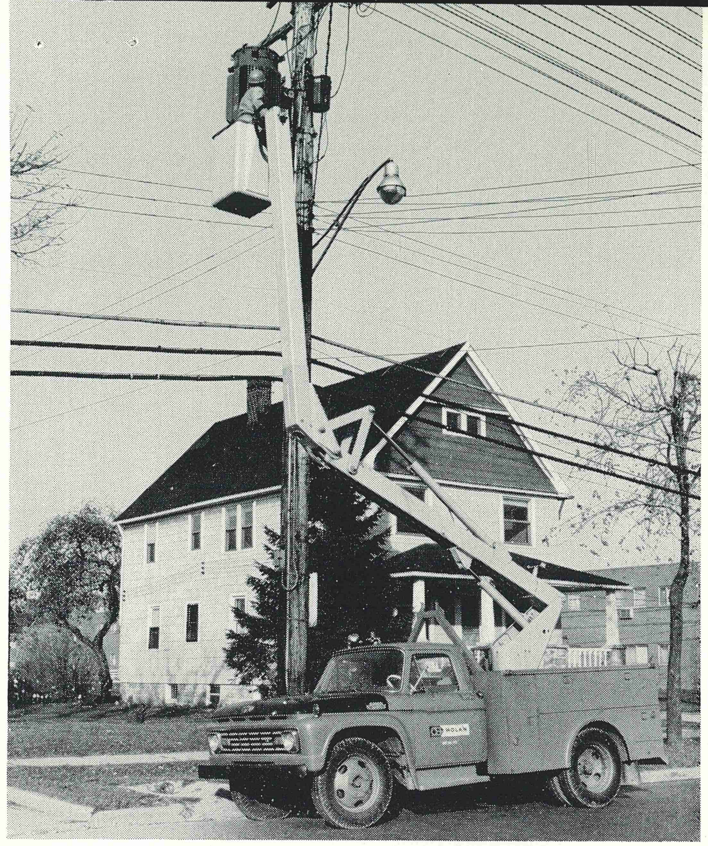


Figure 2 — While this picture was made during a clipping-in operation, and no uplift was present on the line, relief of weight from the V-string support produces a typical sagged condition of strings as might occur where uplift is less than 12 inches. Good construction practice would not condone such an uplift and, if permitted for economic reasons, a risk of damage to ball-and-socket type insulators must be assumed. Auxiliary weight would be indicated in such a case.



Easy mobility and positive positioning of the Bronco 83 puts the lineman "on the spot" — even in congested work areas. Note ground-operated auxiliary controls at the base of the superstructure.

Holan Bronco 83: New pacesetter in versatility

No name could have proved more appropriate for Holan's Bronco 83. It's a rugged aerial elbow that combines operating muscle with quick mobility and pin-point control.

By classification, the Bronco 83 is a light-duty elbow, but it's built with many of the same high-quality components engineered into Holan's heavy-duty models.

First In Variety

The secret of its rapid customer acceptance lies in its versatility — and the Bronco 83 is first on the job in a variety of situations. It's equally effective as general-service equipment, as a tree-trimmer truck, as a street-light maintenance unit, or as a maneuverable and responsive aerial bucket for one-or two-man trouble crews.

That's because the Bronco 83 has been designed to cut aerial jobs down to size . . . to put the crew into the best-possible working position. Models, available in working heights of 32, 37, or 41 feet, will easily lift and position a 300-pound payload—even on a 60-inch chassis without outriggers!

The superstructure rotates 370 degrees in either direction from stop to stop. The upper arm travels through a 200-degree arc in 55 seconds, and the lower arm elevates 90 degrees vertically in 40 seconds.

Standard models of the Bronco 83 are more than adequate for most working conditions. But a big factor in the unit's versatility is the unusual selection of optional features available to meet special requirements.

Optional Features

- A separate engine drive can be installed as a substitute for the conventional power take-off coupling.
- A special swivel device is available to provide continuous turntable rotation in either direction.
- Extra operating convenience (and safety, too) can be provided by installation of buzzer-and-engine stop/start controls in the bucket.
- Addition of an emergency power pack allows the operator to lower the bucket if the primary power fails. The system is complete with a battery-operated combination pump, motor, and reservoir; and features an automatic brake to lock the arms.
- The Bronco 83 doubles as a derrick with the installation of a hydraulic winch and a sheave near the end of the lower arm. Lifting capacities range from 1000 pounds at flat out to 4000 pounds at 75 degrees.
- Compressed air can be made available optionally at the bucket level to drive pneumatic tools, and the hydraulic system can be tapped with a special valve for operation of hydraulic tools.

Look at the Bronco 83 from any angle; *strength, power safety,* or *versatility.* Pound for pound, "spec" for "spec", or dollar for dollar, it stacks up as the best investment in the industry.

For more information about the Bronco 83, write to: HOLAN, Division of The Ohio Brass Company, 4100 West 150th Street, Cleveland, Ohio. 44135.

O-B laboratory certifies 735-kv switch design

New Hydro-Quebec disconnect switch stands 35 feet high . . . insulated with 15-foot stacks of O-B insulators

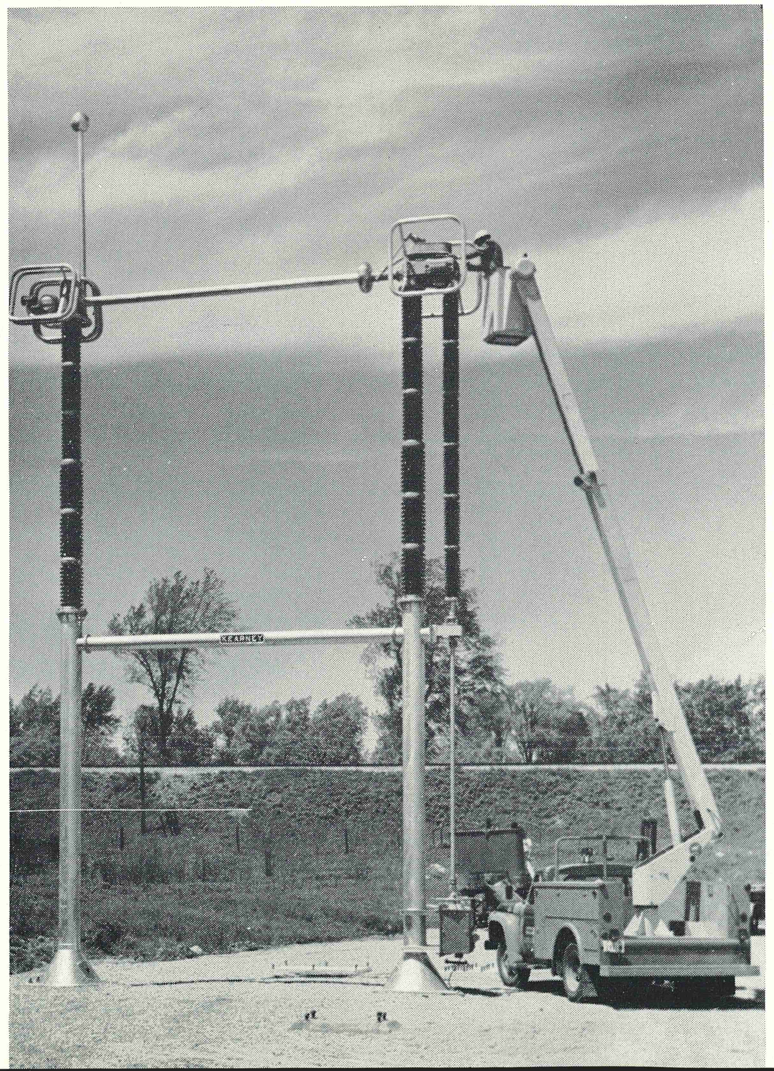
Design specifications have been confirmed for the new single pole, vertical-break disconnect switch to be used on the Hydro-Quebec transmission system. Manufactured in Canada, this switch was brought to O-B's Barberton, Ohio, laboratory for thorough electrical examination with 60-cycle switching surge, and impulse test voltages.

Each 2200-kv BIL pole stands 35-feet high in the closed position — more than 55-feet high to the top of the blade in the open position. Current-carrying parts are made of aluminum, insulated from ground by 15-foot stacks of O-B insulators. The two main stacks are mounted directly on rigid galvanized steel pipe columns. The third stack is mounted to rotate and actuate the switch blade. Aluminum grading rings and terminating spheres shield the switch and aid distribution of voltage across the insulator stacks.

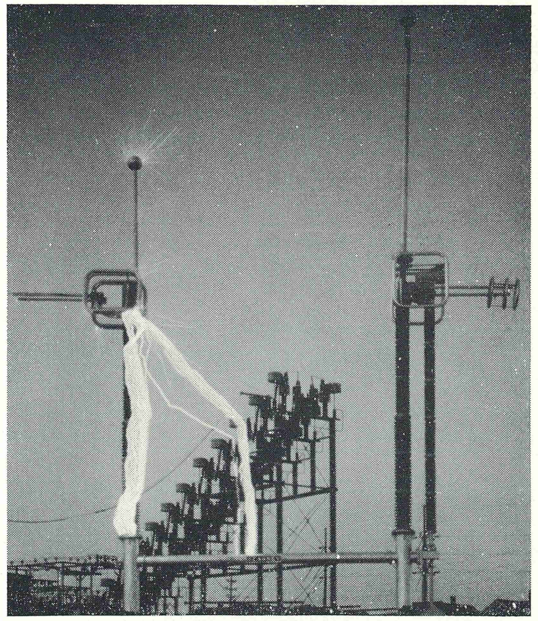
Three poles, spaced at 50-foot intervals, make up a complete switch. Twelve such installations, thirty-six poles, will be used on the 360-mile Manicouagan-Montreal line. Each pole is rated for 3000 amperes when energized at line potential.

Electrical tests in the O-B High Voltage Laboratory established the assembly to be corona free at voltage levels above 500 kv line-to-ground. Sixty-cycle, wet and dry switching surge, and impulse withstand tests were conducted, and established the insulation level of the switch at 2,200 kv BIL.

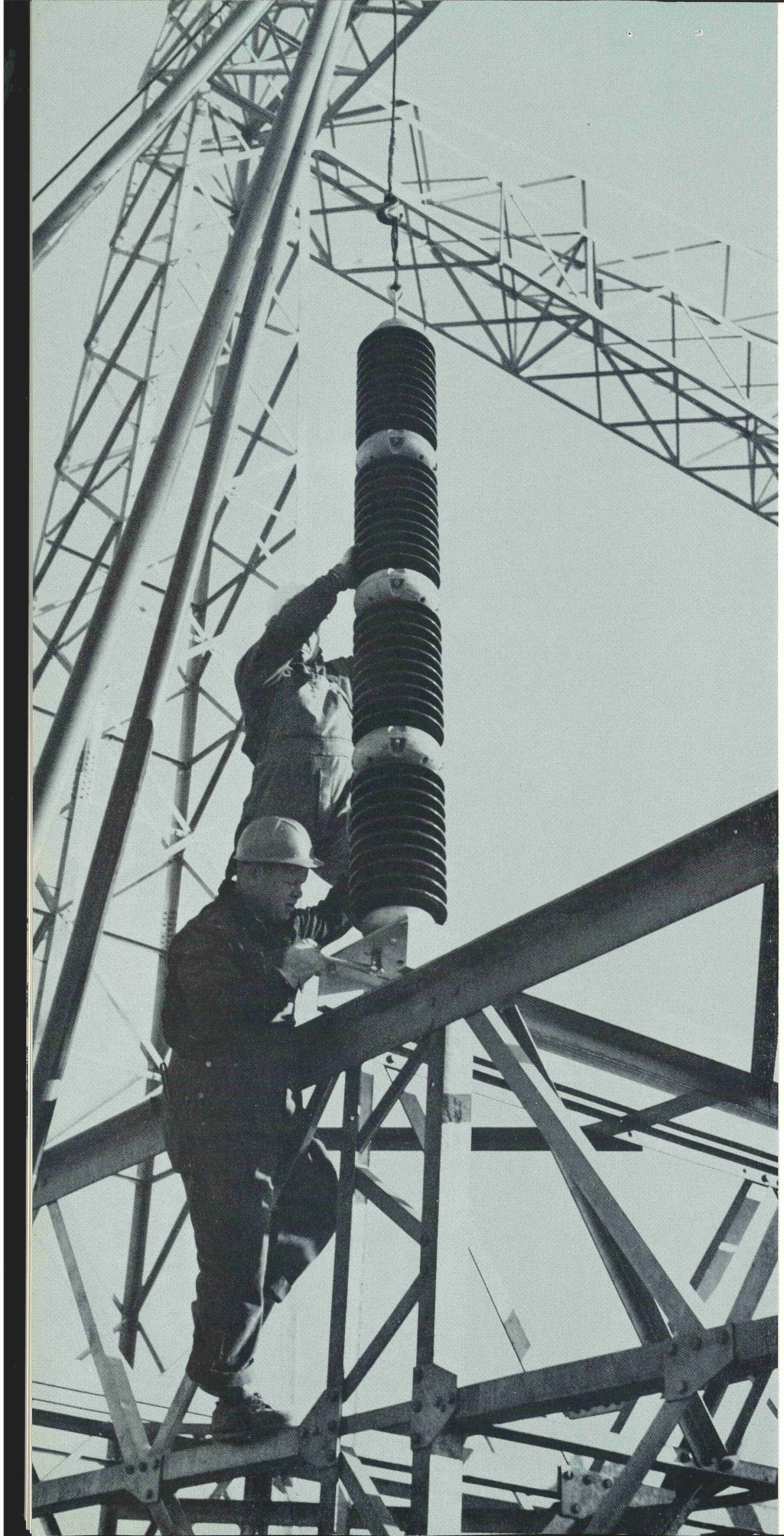
In addition to supplying the switch insulation and performing certification tests, Canadian O-B will furnish lightning arresters, station insulators, and suspension insulators for the new Hydro-Quebec system. This line, when complete, will be the highest voltage and longest line in the western hemisphere, and an important representation of O-B's EHV capability.

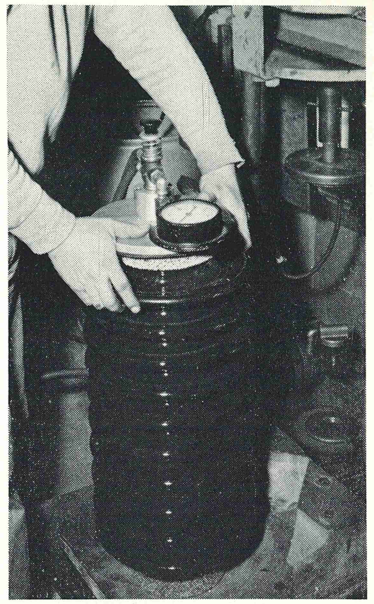


C-O-B's Charger 42 demonstration squirt boom assists with the disassembly of the Hydro-Quebec switch prior to shipment to O-B's Barberton, Ohio, laboratory.

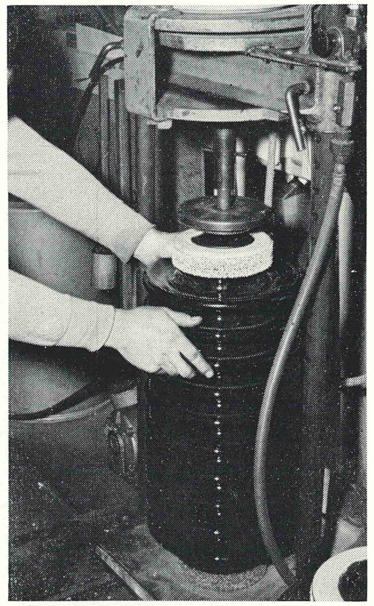


Sixty-cycle flashover on the new Hydro-Quebec 735-kv switch during electrical tests in O-B's High Voltage Laboratory.

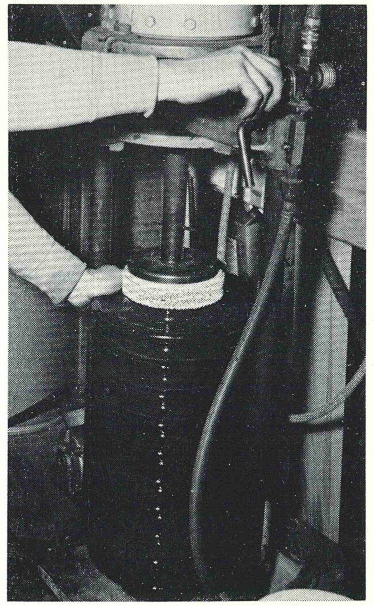




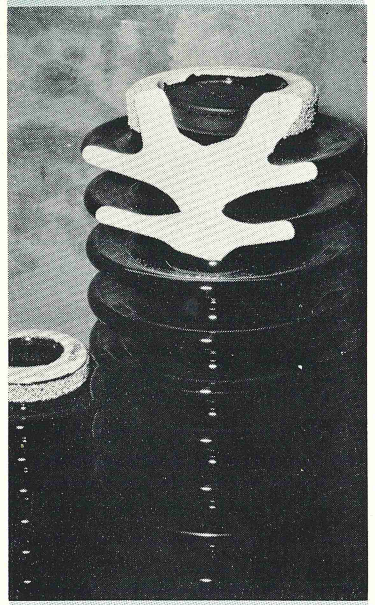
The post cavity is flushed and filled with dry, inert gas.



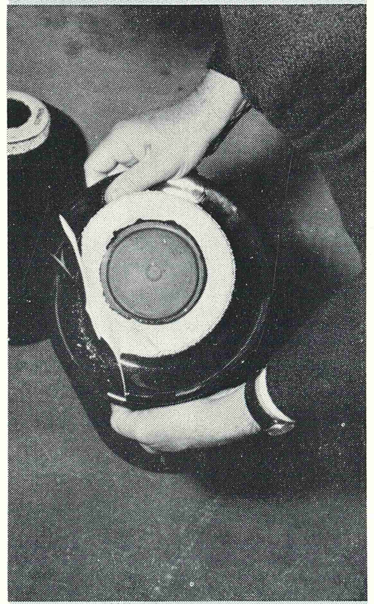
The neoprene-bushed plug is positioned in the cavity opening.



The hydraulic press forces the plug into the tapered passage.



A cutaway section shows the close fit of the sealing plug.



End view of the sealed post shows the plug in final position.

Inside story on O-B station posts

O-B station posts are hollow but not empty. Thorough engineering consideration has been given the treatment and content of the cavity which extends through the greater part of the porcelain post.

Principal reason for the hollow design post lies in the techniques of producing uniformly fired porcelain of the finest grade. But it also saves a great deal in shipping weights and simplifies handling during installation.

From the electrical engineer's point of view, the cavity presents an alternate dielectric. If air and moisture are allowed to be trapped within the cavity or infiltrate by some access route after the sealing operation, premature failure of the post could eventually result from various processes of contamination. In addition, contaminant conductivity inside the station post can cause an increase in RIV and sporadic field test results.

O-B's solution is to completely deactivate the interior of the post and permanently seal its access. This operation is performed after tests have established the electrical and mechanical integrity of the post porcelain. Inside surfaces of the cavity are first coated with silicone and then all air is withdrawn. Next comes a filling operation with a dry, inert gas and finally the insertion of a neoprene-bushed sealing plug by means of a hydraulic plunger. The pressure of the inert gas within the post is at normal atmospheric level to avoid establishing any ambient differential.

The plug used to close the cavity opening is a simple porcelain disk to which a neoprene gasket has been vulcanized. The resilience of the neoprene material "adjusts" the sealing plug to possible slight irregularities of the opening in the porcelain post. Its uniform density provides excellent sealing characteristics. When the plug is forcefully pressed into the slightly tapered opening, these qualities combine to make the resulting seal both impervious and permanent.

In the thousands of station post insulators shipped by Ohio Brass since the adoption of the neoprene-bushed porcelain sealing plug, there has not been a single reported field failure due to internal contamination.

EHV line introduces new material and construction requirements

One of the newest operating EHV projects in the Southwest is Houston Lighting & Power Company's 345-kv line. Energized in 1963, this line has several interesting construction innovations along its 120.6 miles. It extends from H. L. & P.'s W. A. Parish Plant, some 25 miles southwest of Houston, north to a tie-in with Texas Power & Light Company which carries the line on to Dallas. As a result of the new line, the two companies have the mutual advantage of power interchange as requirements dictate.

Ohio Brass Company supplied suspension insulators and insulator hardware for this new line as well as station post insulators for the line terminal station. Special material requirements included stainless steel ball-pins in the suspension insulators, necessary because of the highly corrosive environment, and adaptation of the line hardware to continuous running angles as high as 70 degrees.

O-B 18,000-pound M&E rated units were used in strings of 20 insulators each in single string and V-string assemblies on tangent structures and line angles up to 1 degree. Load requirements were based on 135 mph winds at 60 degrees Fahrenheit or standard NESC Heavy Loading, maximum condition to govern. These specifications dictated the need for two strings of 18,000-pound M & E rated units per phase at angle structures up to 20 degrees and two strings of 36,000-pound units on larger angles and deadend structures. The angle and deadend assemblies utilized 24-insulators per string. The 36,000-pound units were also utilized, 20 per string, in single string and V-string assemblies on long-span tangent structures for river crossings and on certain rolling terrain conditions.

Continuous Loop Deadends

Only two deadends were used on the entire H. L. & P. section — one at the W. A. Parish substation and the other at the tie point with T. P. & L. near Jewett, Texas. O-B's bolted deadend clamps were utilized in these positions to permit a continuous jumper. Major angles were accommodated by special towers, designed for single circuits, which permit continuous running angles as high as 70 degrees.

Each phase consists of a dual conductor bundle with 18-inch spacing, employing Drake ACSR conductor. Span length averages 1041 feet, with slightly over five towers per mile. The paired conductors were simultaneously pulled through a tensioning machine which applied uniform tension to the two members while pulling in. Approximately every two miles, the phase bundle was sagged with catch-off cables and aluminum clamps. Extra blocks, attached to the stringing blocks, held the catch-off cables during the sagging.

Double-Circuit Tangent Towers

Double-circuit galvanized steel tangent towers support this single circuit system, and allow for the addition of a second circuit when the need arises. Basic tangent towers measure 108 feet high and have two crossarms for the phase conductors and one for ground wire supports. The lower crossarm supports two phases, one on a V-string and the other on a single string, while the upper phase arm supports a single-phase with a single string of insulators. Companion towers of 112 and 115 feet for use at grades and river crossings were obtained by using different lengths on the lower tower section. Additional tower heights were achieved by adding lower extensions to the 108-foot tower.

Ground wires, positioned 22 feet above the top phase conductors provide a shielding angle of approximately 23 degrees.

Lightweight Ringless Hardware

O-B ringless hardware is used throughout the H. L. & P. line. All malleable iron yokes have rounded corners and toroidal sections for optimum electrical and mechanical performance. Due to the application of malleable iron in an open-type yoke assembly, the insulator hardware is very lightweight and was easily installed. The hardware exhibits very low RIV levels and causes no disturbances in the populated areas transversed by the line.

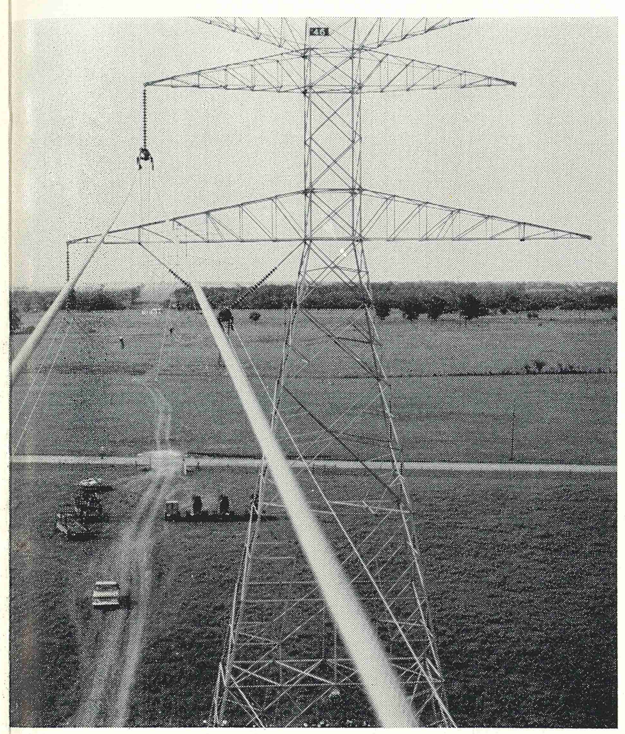
O-B worked closely with H. L. & P. on the design and performance tests of the insulators and insulator - hardware assemblies. Complete performance information was obtained by testing each design in the outdoor section of the O-B High Voltage Laboratory before construction began. Ohio Brass takes pride in its participation on this modern EHV project, and offers its facilities and engineering staff to all those contemplating new construction or modernization at the EHV level.

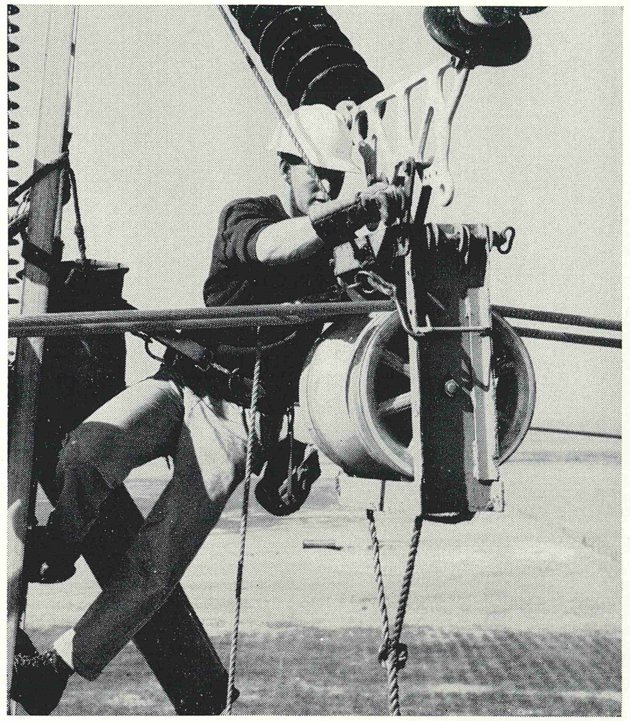
Double-circuit galvanized steel towers, 108 feet high, support Houston Lighting & Power Company's new single circuit 345-kv line.

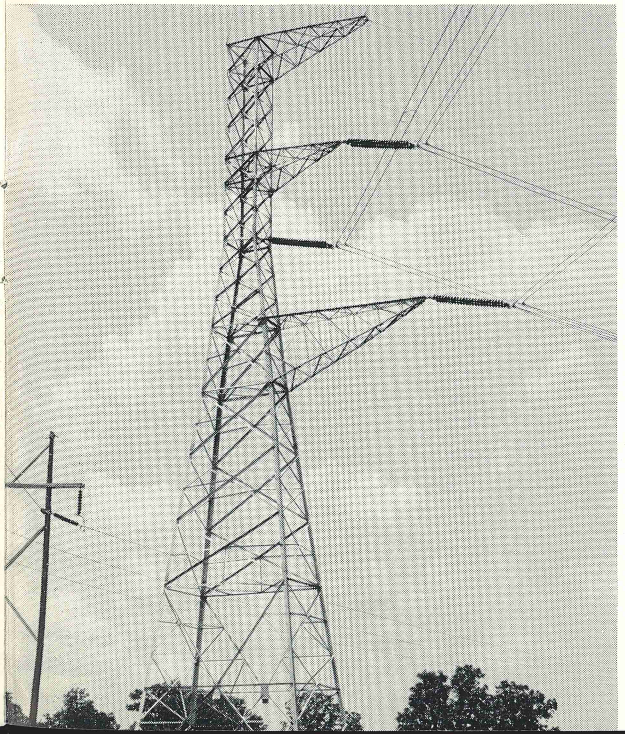
This new EHV line has running angles as high as 70 degrees. Insulators and hardware had to be specially designed to withstand the load applied at these heavy angles.

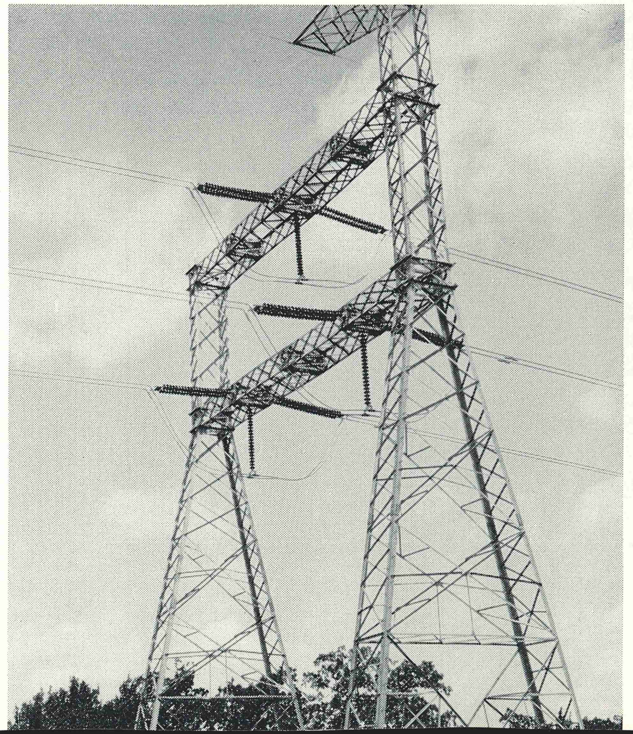
Lightweight malleable iron suspension yokes and hardware were easy to handle during construction operations.

Only two deadends appear on the entire H. L. & P. line—one at the beginning and one at the tie point with T. P. & L. Note the bolted strain clamps which provide a continuous jumper loop.

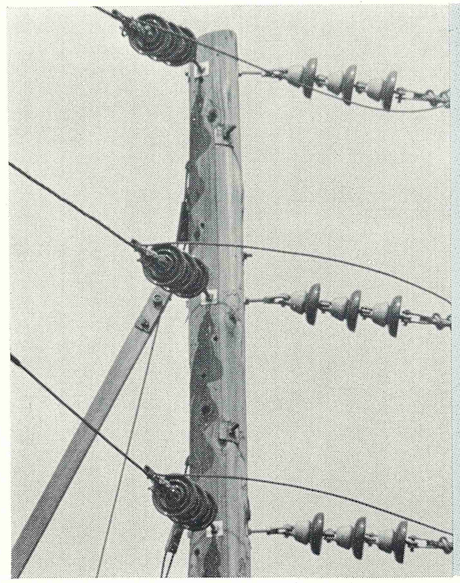




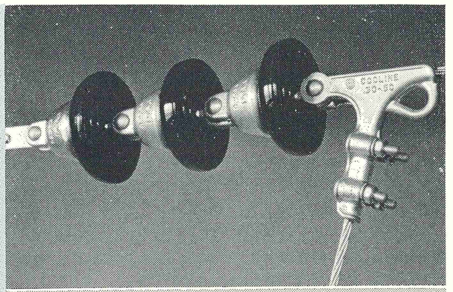




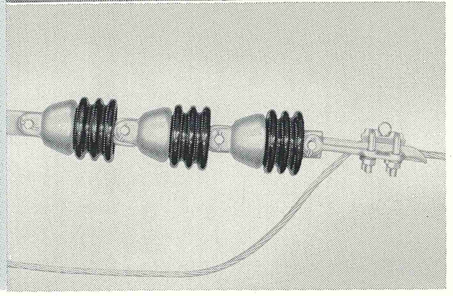
Which deadend insulator do you prefer?



◀ VERTICAL DEADEND — O-B six-inch suspensions installed on a corner pole after re-insulation of distribution line from 7.2 kv to 12.5 kv.



O-B SIX-INCH suspension intors and aluminum clamp. ▶



O-B FOUR-AND-ONE-QUARTER-INCH suspension insulators and Ohio Brass aluminum clamp. ▶

O-B clevis-type distribution suspensions available from stock in conveniently located Graybar warehouses

It's your choice. Based on your needs, you can order the O-B suspension insulator you want and get prompt delivery. Nearby Graybar warehouses stock O-B suspension insulators for distribution deadends in porcelain disc diameters of four and one-quarter and six inches.

Both units are generally interchangeable in distribution applications, and they have good performance records. Important factors in making a selection are often price, appearance, and delivery. Ohio Brass and Graybar team up to offer you the best deadend deal and the best suspension insulator.

Catalog Number 32433, the six-inch unit, is the larger seller. Perhaps it's more popular with buyers because it's designed in accordance with ASA standards for distribution insulators. It's a common sight on urban and rural distribution lines.

Catalog Number 42399 was designed for use where the largest portion of leakage distance need be exposed. Its small diameter, four and one-quarter inches, makes it readily adaptable to coverage by rubber goods for hot-line working. It's a rugged, compact unit which resists handling damage.

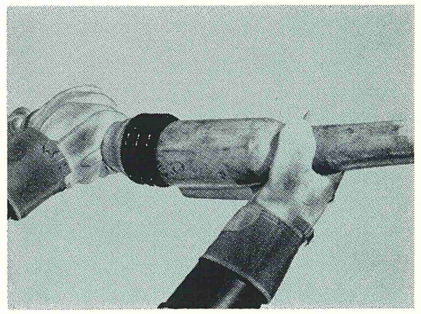
"Togetherness"

The components of Ohio Brass distribution suspensions are "made together to work together." Their tough, malleable-iron caps and ageless-porcelain bodies are wedded by a combination of design and manufacturing skills. The results are insulators with extra assurances of compatability in performance, dimension, and service life. O-B is the only manufacturer of suspension insulators to produce the porcelain *and* the matching hardware.

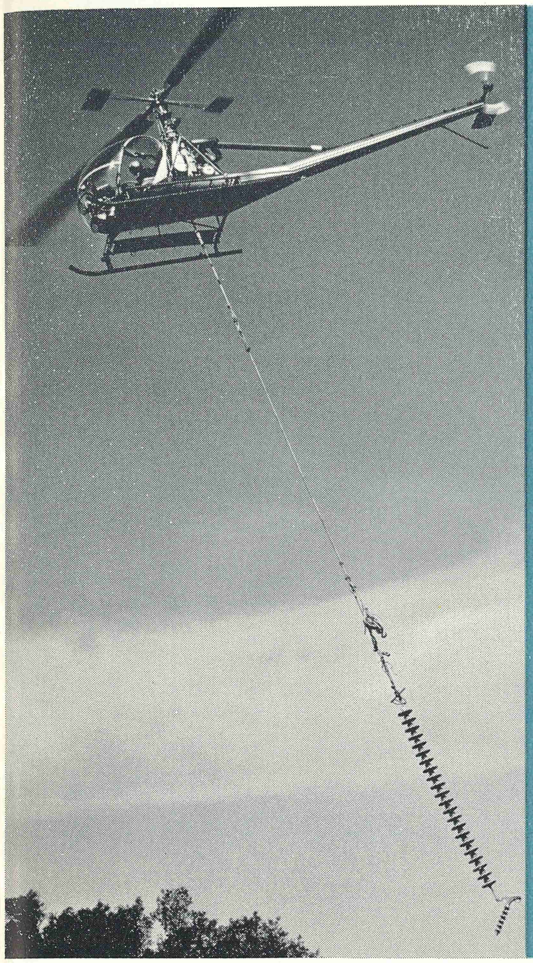
Hex rivets, which tend to minimize RI, are standard on all Ohio Brass clevis connections at distribution voltages.

The first practical suspension insulator was developed by Ohio Brass in 1911. For more than 50 years, Ohio Brass has led the industry in suspension insulator production and in the development of manufacturing controls that assure products of uniformly high quality. The number of O-B transmission and distribution insulators in service all over the world is approaching the 100-million mark. This record of acceptance and performance is a "working" testimonial to O-B's ability to produce insulators for your distribution system.

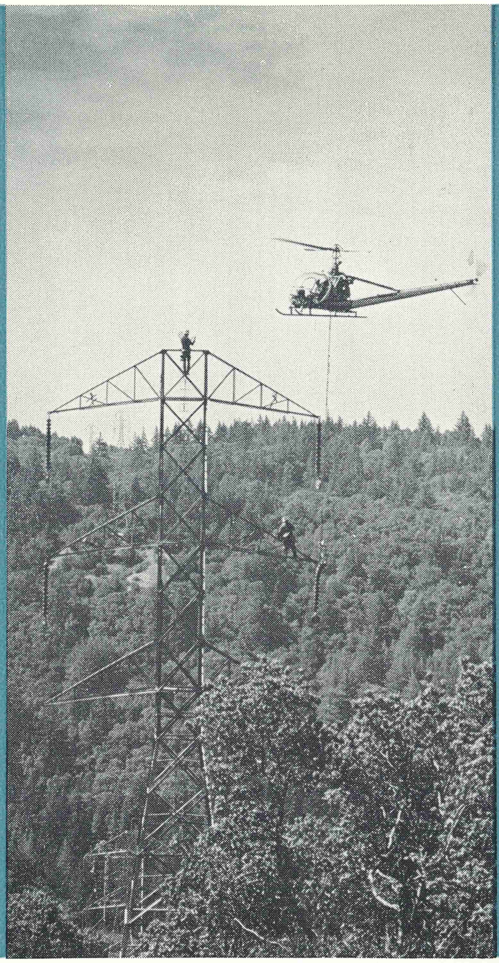
Talk to your Graybar salesman next time he calls. Ask him about Ohio Brass six-inch and four-and-one-quarter-inch suspension insulators for deadends . . . and the other fine O-B products.



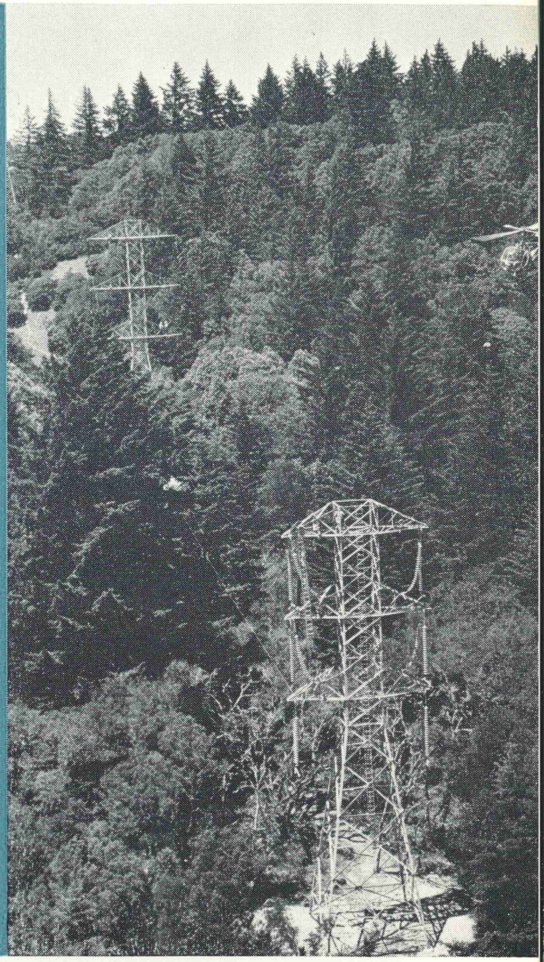
RUBBER GOODS can be used readily with smaller diameters of four-and-one-quarter-inch deadend.



Insulators and hardware were carried via helicopter to the individual tower sites on a new P. G. & E. 230-kv line.



While the lineman atop the tower gives directions, the one on the middle arm prepares to connect an insulator string to the tower.



Strings of O-B suspension units were used to support and insulate the conductors at deadend positions on this double circuit system.

O-B Insulators arrive "Air Freight"

Right-of-way restrictions and requirements calling for the minimum use of access roads made the use of helicopters economical in the construction of two new Pacific Gas & Electric Company 230-kv lines. Helicopters carried personnel and material to the construction sites, and "leapfrogged" men and equipment from tower to tower.

Helicopters were used extensively for access and construction on the Monta Vista-Jefferson line. Ohio Brass hardware materials were used on this twenty-mile double circuit line built to supply power to the Jefferson substation near Woodside, California. Span lengths of this line over the Santa Cruz Mountains vary from 421 feet to 3,065 feet.

Ohio Brass supplied insulators and the major hardware items for a second 230-kv system which spans the 22 miles from the southern tidal bay area Newark substation at Fremont to the San Mateo station at San Mateo, California. Twin insulator strings of twenty-four 25,000-pound Futura units each were flown in for use on deadend structures. Tangent construction on this double-circuit line consists of single strings of thirteen O-B 15,000-pound M & E rated Smogtype insulators.

All aluminum, 1113 MCM conductor was used on all but a 1.3-mile section of this line which crossed the San Francisco Bay. Here the 1113 MCM ACSR channel crossing span was suspended from two 363-foot towers spaced 2,435 feet apart. O-B 25,000-pound Futura Smogtype insulators were used on this crossing. Span lengths across the remainder of the line vary from 578 feet to 1,563 feet. Helicopters were effectively used to deliver insulator strings complete with stringing sheaves attached and to move men from tower to tower in an average time of two minutes.

How porcelain is made

(Second in a Series)

How liquid clay mixture is converted into a semi-solid and de-aired for shaping of a "porcelain personality"

So far in our look at the manufacture of Ohio Brass porcelain, we have taken white china clays, dark ball clays, and other clay minerals and intensively mixed them with water. After the mixing, vibratory screening separated the foreign matter from the suspension. Next, we will see the reconversion of the clay mixture into a semi-solid mass.

"Pumping the Presses"

As the production schedule calls for it, the liquid clay mixture is piped from storage into pressure tanks and forced under pressure into long, trough-like filter presses. "Pumping the presses" in this manner forces the water out of the clay by liquid pressure. Water runs out of the mixture and the clay "residue" remains in hundreds of disk-shaped chambers. The results are hundreds of clay filter cakes weighing approximately 38 pounds each. Each filter cake is a dense mass of pure clay shaped into a giant molded disk.

Our porcelain-to-be now stands as a mass of material described as soft-cake clay. In this state it can be used in pug mills for the "hot-press" manufacture of porcelain products such as small pintypes, suspension insulators, and multi-part insulators. Or, the filter cakes can be stored on pallets and storage-dried to make a stiffer clay -- for use in pug mills and the manufacture of large extrusions such as for lightning arresters and bushings.

Pug Mills

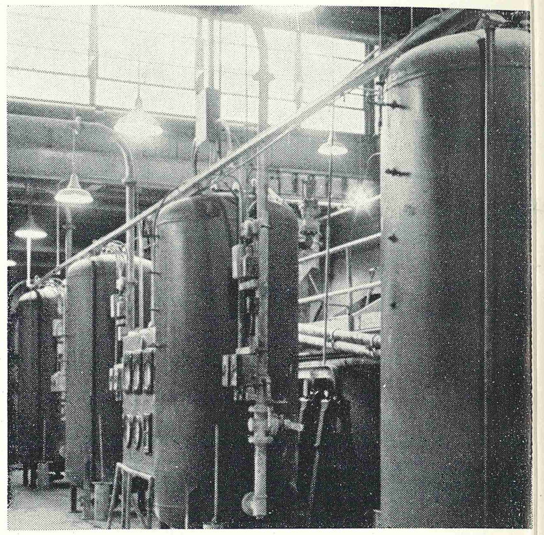
Formation of the filter cake is one of the last stages of manufacture common to all clay bodies. From the filter press, the cakes are stored and "aged" or they are routed directly to a "hot-press" pug mill. In either event, all filter cakes, soft or aged, must be processed through a pug mill before the next step of manufacture. Further steps are peculiar to individual products and they direct the material toward its final identity as a finished product.

A pug is a cylindrical mass of pure clay formed by a pug mill. Size and shape of the pug depends upon what finished product it is destined to be. However, the primary purpose of the pug mill is moisture redistribution and de-airing of the clay mixture. The mill operates under a vacuum and removes the air entrapped in the mixture and further compacts the clay mass. Each pug is a soft dense solid.

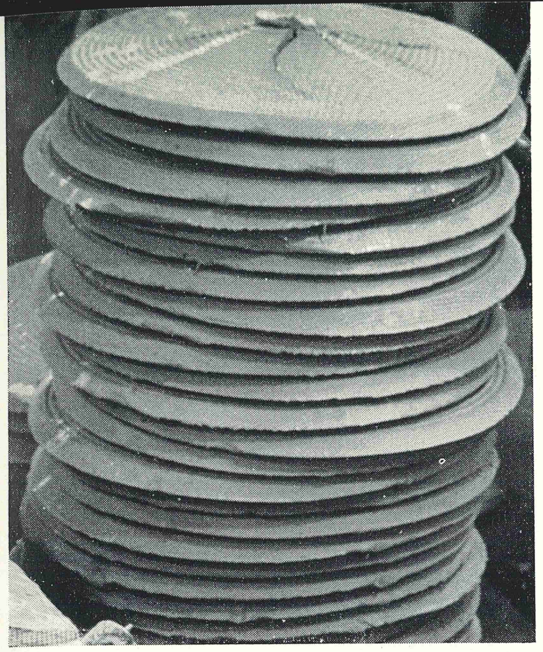
Next, it begins to take on some product identity or it is stored again to age in pug form.

Our story will continue. We will see the faceless pugs enter three phases of production which give "personality" to the clay: 1) hot pressing, 2) green trimming, and 3) dry trimming. Each phase is different and each offers important contributions to the manufacture of fine porcelain for the products Ohio Brass makes available to the electric utility industry.

PRESSURE TANKS in filter-press room force water suspension from storage into presses for reconversion of clay mixture into a soft solid.

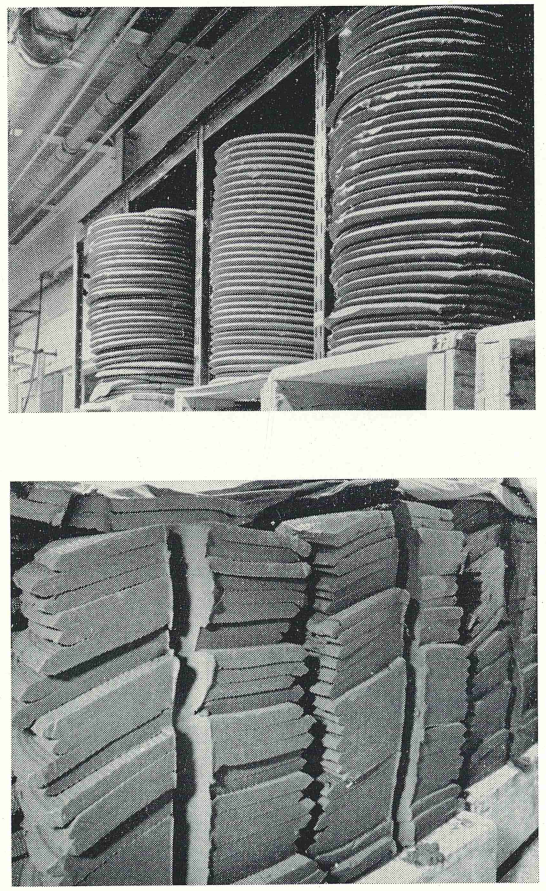


PUMPING THE PRESSES -- liquid clay mixture enters presses under pressure, process converts clay from water suspension to semi-solid; each vertical rib represents one filter cake.

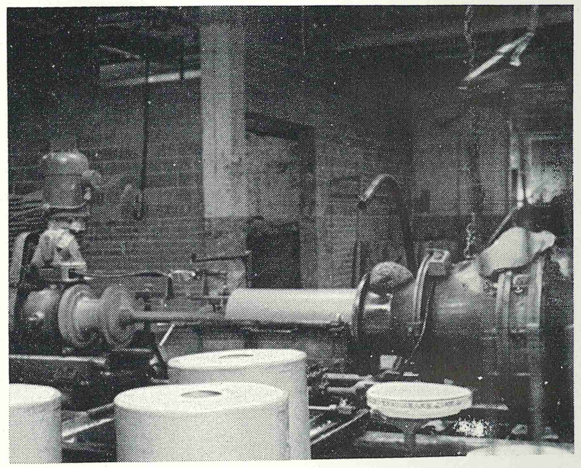


FILTER CAKES are products of filter presses. Soft clay disks are palletized for storage, or transport to pug mills for the hot-press manufacturing process.

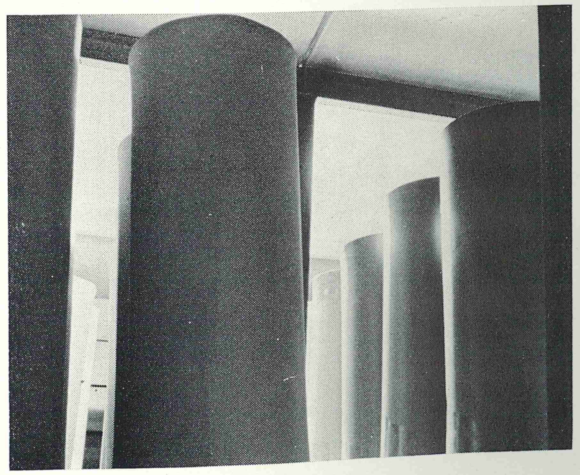
STORAGE SITES for filter cakes reveal two methods of handling. Whole cakes in bins require less drying; cakes are halved to provide maximum drying of wet centers.



PUG MILL operator folds soft, moist filter cakes and puts them into hopper of a pug mill. De-airing and moisture redistribution of the clay are primary functions of pug mills.



DENSE MASS of clay is extruded from the pug mill. Pugs are placed on pallets for trucking to drying storage. Other mills form pugs for hot-press processing.



HEATED STORAGE -- pugs are stored under heat in a special drying area prior to movement to dry-trim processing.

OHIO BRASS MANAGEMENT REPORT

You can smile in the rain as new generator attacks your EHV problem

BY ROGER A. BLACK
PRESIDENT, OHIO BRASS COMPANY

People who enjoy rain are usually incurable romantics, farmers, or roofing salesmen. Make of it what you will but I must admit that I recently stood in the rain and smiled. If you had been there and had an EHV problem, you would have smiled, too. The place was the O-B High Voltage Laboratory. The occasion was the firing of a new four-million-volt, high-energy impulse generator. The rain poured down on the generator. But it could have been standing in the middle of the desert. It fired and continued to fire, demonstrating that O-B could do outdoor testing, rain or no rain.

THE NEW UNIT rises almost 50 feet in a stairstep design that resembles a giant pipe organ. Firing gaps are enclosed in metal housings mounted at each step. The enclosures, plus the special care used in protecting other circuit components, make all-weather testing possible.

I WON'T ARGUE THE MERITS of indoor versus outdoor testing since we have long done both, depending on the most realistic way to attack the problem. More significant to our customers is the increase in our capability to do outdoor testing. Not only can we work in all kinds of weather — just like the full-scale transmission line components under test will be required to do in service — but we also have a research tool especially designed to analyze switching surges on extra-high-voltage systems. And the switching surge has been singled out as the most important factor to consider in insulating a line of 345 kv or higher.

THE NEW GENERATOR has five times the energy output of our three-million-volt generator so it's obvious that the voltage is only one measure of its capability. It has been especially designed to produce switching surge wave shapes. Because of O-B experience with lightning arresters and insulators and because of our laboratory facilities, both new and old, we are especially qualified to help you handle switching surges in the most economical way. The savings can quickly run into the millions. We know this is true because we've already helped do it.

IT'S EASY TO SMILE, even in a hard rain, when you look at a tool that can make possible this kind of savings. And I would hope our customers could smile a little, too.

728-H

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Canadian Ohio Brass Co. Ltd. • Niagara Falls, Ontario

OHIO BRASS

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M. A. Stark

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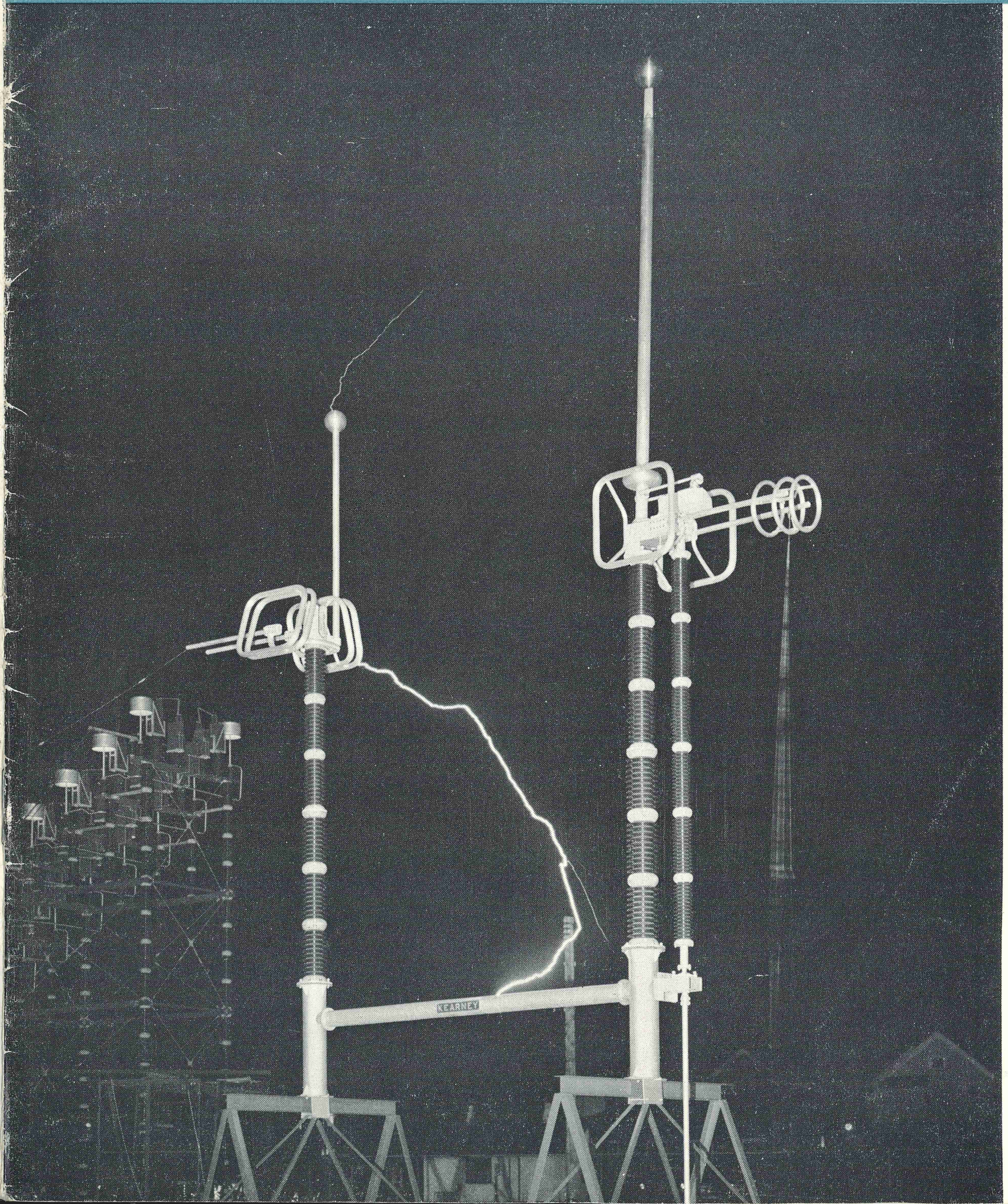

Impulse flashover of the new 735-kv Hydro-Quebec disconnect switch during design tests in O-B's High Voltage Laboratory. See page 7.